

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A device for automated composite lay up using a material delivery head, comprising:

 a mandrel having a vertical axis and an outside mold surface on the inside of said mandrel;

5 a vertical movement shaft disposed inside said mandrel;

 an arm mechanism, supported by said vertical movement shaft, that moves and positions the material delivery head inside said mandrel, wherein composite material is delivered directly to said outside mold surface; and

10 a pressure vessel having heating channels and surrounding said mandrel.

2. (original) The device of claim 1, further comprising:

 a platform supported by said vertical movement shaft wherein said platform moves vertically up and down inside said mandrel.

3. (canceled)

4. (original) The device of claim 1, wherein:

 said arm mechanism supports the material delivery head;

 said arm mechanism provides full circumferential positioning of the material delivery head inside of said mandrel at said outside mold surface.

5-8. (canceled)

9. (currently amended) A device for automated composite lay up of a part, comprising:

a mandrel having a vertical axis, wherein said mandrel has an interior mandrel surface that conforms to an outside mold line of the part;

5 a pressure vessel surrounding said mandrel, said pressure vessel having heating channels that maintain a temperature of said interior mandrel surface;

a vertical movement shaft disposed inside said mandrel;

an arm mechanism supported by said vertical movement shaft;

10 and

a material delivery head, supported by said arm mechanism, wherein said arm mechanism moves and positions said material delivery head relative to said interior mandrel surface, wherein composite material is delivered directly to said outside mold line on said interior mandrel surface.

10. (original) The device of claim 9, wherein said mandrel includes two separable portions that facilitate removal of the part.

11. (original) The device of claim 9, further comprising:

a platform that is supported and moved up and down by said vertical movement shaft wherein said arm mechanism is attached to said platform.

12. (canceled)

13. (original) The device of claim 9, wherein:

said arm mechanism provides full circumferential positioning of said material delivery head to said outside mold line on said interior mandrel

surface.

14. (original) The device of claim 9 wherein:

said arm mechanism provides motion of said material delivery head relative to said interior mandrel surface in a direction normal to said interior mandrel surface; and

5 said arm mechanism provides rotation of said material delivery head relative to said interior mandrel surface about an axis normal to said interior mandrel surface.

15. (currently amended) A device for automated composite lay up of a part, comprising:

a mandrel having a vertical axis, wherein said mandrel has an interior mandrel surface that conforms to an outside mold line of the part;

5 a pressure vessel having heating channels and surrounding said mandrel;

an autoclave door sealable to said pressure vessel;

a vertical movement shaft disposed inside said mandrel;

10 a platform that is supported and moved up and down on said vertical movement shaft;

an arm mechanism attached to said platform; and

a material delivery head, supported by said arm mechanism, wherein said arm mechanism moves and positions said material delivery head relative to said interior mandrel surface, wherein composite material is delivered

15 directly to said outside mold line on said interior mandrel surface.

16. (original) The device of claim 15 wherein:

said arm mechanism provides motion of said material delivery head relative to said interior mandrel surface in a direction normal to said interior mandrel surface; and

5 said arm mechanism provides rotation of said material delivery head relative to said interior mandrel surface about an axis normal to said interior mandrel surface;

 said arm mechanism provides circumferential positioning of said material delivery head relative to said interior mandrel surface.

17. (original) The device of claim 15, further comprising:

 a plurality of material delivery heads, wherein said plurality of material delivery heads delivers composite material directly to said outside mold line on said interior mandrel surface.

18. (original) The device of claim 15, wherein:

 said platform supports a creel for said material delivery head;

 said platform supports a control module for said arm mechanism;

and

5 said platform is dimensioned to support a human operator.

19. (original) The device of claim 15, wherein said mandrel includes at least two separable portions that facilitate removal of the part.

20. (canceled)

21. (currently amended) An aircraft part manufacturing device for automated composite lay up, comprising:

 a mandrel having a vertical axis, wherein said mandrel has an interior mandrel surface that conforms to an outside mold line of the aircraft 5 part;

a pressure vessel surrounding said mandrel, said pressure vessel having heating channels that maintain a temperature of said interior mandrel surface;

an autoclave door sealable to said pressure vessel that maintains

10 a pressure at said interior mandrel surface;
 a vertical movement shaft disposed inside said mandrel;
 a platform wherein:
 said platform is supported by said vertical movement shaft;
 said platform is moved up and down on said vertical
15 movement shaft; and
 said platform rotates about said vertical axis;
 an arm mechanism attached to said platform; and
 a material delivery head, supported by said arm mechanism,
wherein:
20 said arm mechanism provides motion of said material
 delivery head relative to said interior mandrel surface in a direction normal to
 said interior mandrel surface; and
 said arm mechanism provides rotation of said material
 delivery head relative to said interior mandrel surface about an axis normal to
25 said interior mandrel surface;
 said arm mechanism provides circumferential positioning of
 said material delivery head relative to said interior mandrel surface; and
 composite material is delivered directly to said outside mold
line on said interior mandrel surface.

22. (canceled)

23. (currently amended) An aircraft part manufacturing device for
automated composite lay up, comprising:
 a mandrel having an axis of symmetry and an outside mold
surface on the inside of said mandrel,
5 means for maintaining a temperature and pressure condition on
said inside of said mandrel;

means for situating said mandrel so that said axis of symmetry is vertical;

10 and means for supporting a material delivery head inside said mandrel;

means for moving and positioning the material delivery head inside said mandrel so that composite material is delivered directly to said outside mold surface.

24. (original) The device of claim 23, further comprising:

means for moving the material delivery head vertically up and down inside said mandrel.

25. (original) The device of claim 23, further comprising:

means for circumferentially positioning the material delivery head about a vertical axis and around the inside of said mandrel.

26. (canceled)

27. (original) The device of claim 23 wherein said means for supporting a material delivery head further comprises:

means for providing motion of said material delivery head relative to said outside mold surface in a direction normal to said outside mold surface;

5 and

means for providing rotation of said material delivery head relative to said outside mold surface about an axis normal to said outside mold surface.

28. (currently amended) A method for automated composite lay up of a part, comprising steps of:

situating a mandrel, having an axis and an outside mold surface on the inside of said mandrel, so that said axis is vertical;

5 placing said mandrel so that a vertical movement shaft is disposed inside said mandrel;

supporting an arm mechanism by said vertical movement shaft wherein said arm mechanism moves and positions a material delivery head inside said mandrel; and

10 delivering composite material directly to said outside mold surface;

and

curing said composite material via use of heating channels in a pressure vessel surrounding said mandrel providing temperature control of said outside mold surface on the inside of said mandrel and pressure control in the

15 inside of said mandrel.

29. (original) The method of claim 28, further comprising steps of:
attaching said arm mechanism to a platform;
supporting said platform by said vertical movement shaft;
moving said platform up and down using said vertical movement
5 shaft.

30. (original) The method of claim 28, further comprising a step of:
rotating said platform and said arm mechanism around a vertical
axis.

31. (canceled)

32. (original) The method of claim 28 wherein said supporting step
further comprises:

providing motion of said material delivery head relative to said
outside mold surface in a direction normal to said outside mold surface; and

5 providing rotation of said material delivery head relative to said
outside mold surface about an axis normal to said outside mold surface.

33. (original) The method of claim 28, further comprising steps of: separating a plurality of separable portions of said mandrel; and removing the part.